



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/883,085	06/15/2001	Lute Maleki	06618-652001/CIT 3237	8650
20985	7590	05/10/2004	EXAMINER	
FISH & RICHARDSON, PC 12390 EL CAMINO REAL SAN DIEGO, CA 92130-2081			PAYNE, DAVID C	
			ART UNIT	PAPER NUMBER
			2633	
DATE MAILED: 05/10/2004				6

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/883,085

Applicant(s)

MALEKI, ET AL

Examiner

David C. Payne

Art Unit

2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 April 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,8-32 and 34-46 is/are rejected.
- 7) ☒ Claim(s) 2-7 and 33 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 June 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the *satellite, transceiver, base station, moving unit, free space system, fiber system, wireless system, and wired system* (see claims 39-41 and 43-46) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 36, 38, 39-41 and 43-46 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure that is not enabling. The system structure (*satellite, transceiver, base station, moving unit, free space system, fiber system, wireless system, and wired system*) critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). Applicant merely mentions that the resonator is used in multiple transmission systems but provides not detail of the structure of the system.

Art Unit: 2633

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 36, 38, 39-41 and 43-46 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 36, 38, 39-41 and 43-46 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: Applicant merely mentions that the resonator is used in multiple transmission systems but provides not detail of the structure of the system.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 17-23, 28 - 32, and 34-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho US 6,009,115 (Ho).

Regarding claim 1, 17, 29, 30, 34, and 35

Ho disclosed,

Art Unit: 2633

A device, comprising: an optical resonator (Figure 1 #12) designed to support whispering gallery modes (e.g. col./line: 6/60-67) and formed of a dielectric material (e.g. col./line: 5/20-25) that has an energy level structure that absorbs light at a selected optical frequency and absorbs electrical energy at an electrical frequency (e.g. col./line: 10/55-65),; an optical coupler (Figure 10, #14, #16) positioned adjacent to said optical resonator to evanescently couple optical energy into said optical resonator in a whispering gallery mode (e.g. col./line: 6/60-67) or out of said optical resonator (Figure 10); and an electrical coupler (Figure 10 #110) positioned to couple an electrical signal at said electrical frequency into said optical resonator.

Ho does not disclose that the electric field is to at least partially overlap with said whispering gallery mode to modulate optical energy in said optical resonator by modulating said absorption and wherein absorption of said electrical energy changes absorption of said light. However, It would have been obvious to one of ordinary skill in the art at the time of invention that the applied electric field which induces changes in the refractive index of the micro-cavity resonator as disclosed by Ho (e.g., col./line: 10/60-65) will cause wavelengths responsive to the electric field to be absorbed in the resonator since a change in the refractive index changes the absorptive properties.

Regarding claims 18-23,

Ho disclosed a spherical, ring, disk shaped resonator (Figure 1 #12).

Regarding claim 28, 31, 32

Art Unit: 2633

Ho disclosed (Figure 1A) wherein said optical coupler includes an input coupler (14) and an output coupler (16).

Regarding claim 30,

Ho does not disclose an optical detector coupled to convert said optical output into an electronic signal. However it would have been obvious to one of ordinary skill in the art at the time of invention to convert the optical signal into an electrical signal so that it can be used at the end of a communication system (e.g., Ho, col./line: 9/45-55). It is extremely well known in the art to use detectors in fiber optic communication systems.

Regarding claims 36, 38, (insofar as it is understood based on the 112 rejection)

Ho disclosed the aforementioned invention.

Ho does not place the resonator into a wireless communication environment where an antenna receives the electromagnetic wave signal and thereby applies an electric frequency to the resonator.

However, It would have been obvious to one of ordinary skill in the art at the time of invention that antenna that receives an electromagnetic wave is no different than a conductor that receives an electric current. The applicant has merely changed the operating environment of the invention and is therefore not considered patentable over the prior art.

Regarding claim 37,

Ho disclosed (Figure 10) a light source (102) operable to produce said light.

3. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ho US 6,009,115 (Ho) in view of Vahala et al. US 6,580,851 B1 (Vahala).

Regarding claim 42,

Ho disclosed,

A device, comprising: an optical resonator (Figure 1 #12) designed to support whispering gallery modes (e.g. col./line: 6/60-67) and formed of a dielectric material (e.g. col./line: 5/20-25) that has an energy level structure that absorbs light at a selected optical frequency and absorbs electrical energy at an electrical frequency (e.g. col./line: 10/55-65); an optical coupler (Figure 10, #14, #16) positioned adjacent to said optical resonator to evanescently couple optical energy into said optical resonator in a whispering gallery mode (e.g. col./line: 6/60-67) or out of said optical resonator (Figure 10); and an electrical coupler (Figure 10 #110) positioned to couple an electrical signal at said electrical frequency into said optical resonator.

Ho does not disclose that the electric field is to at least partially overlap with said whispering gallery mode to modulate optical energy in said optical resonator by modulating said absorption and wherein absorption of said electrical energy changes absorption of said light.

However, It would have been obvious to one of ordinary skill in the art at the time of

Art Unit: 2633

invention that the applied electric field which induces changes in the refractive index of the micro-cavity resonator as disclosed by Ho (e.g., col./line: 10/60-65) will cause wavelengths responsive to the electric field to be absorbed in the resonator since a change in the refractive index changes the absorptive properties.

Ho also does not disclose that the optical light coupled between fibers in the resonator carries information. Vahala disclosed a whispering gallery mode resonator that couples power and signals between fibers (e.g., col./line: 1/10-20, 2/25-30). It would have been obvious to one of ordinary skill in the art at the time of invention to apply information to the optical signals in the Ho experiment, as does Vahala. One finds motivation to combine the teachings as such since Vahala disclosed this as an appropriate means of providing bi-directional communication in an optical system (see previous passage).

4. Claims 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho US 6,009,115 (Ho) in view of Boord et al. US 6,441,934 B1 (Boord).

Regarding claim 25,

Ho does not disclose at wherein said optical coupler includes an angle-polished waveguide. Boord disclosed the use of angle-polished waveguide (e.g., col./line: 2/52-56). It would have been obvious to one of ordinary skill in the art at the time of invention to use an angle-polished waveguide to reduce back reflection and thereby reduce noise caused by feedback to the light source as disclosed by Boord in the same passage.

Regarding claim 26,

Art Unit: 2633

Ho disclosed wherein said waveguide is a fiber (e.g., col./line: 9/48-52).

Regarding claim 27,

Ho disclosed wherein said waveguide is a planar waveguide formed on a substrate ().

5. Claims 8, 9, 11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho US 6,009,115 (Ho) in view of Heo et al. US 6,272,277 B1 (Heo).

Regarding claims 8, 9 and 11,

Ho does not disclose wherein said dielectric material is doped with transition ions including chromium or manganese. Heo disclosed a resonator doped with chromium and manganese ions (e.g., col./line: 2/55-65). It would have been obvious to one of ordinary skill in the art at the time of invention to use the dopants in Heo in the Ho resonator so as to increase the optical amplification efficiency (same passage).

Regarding claim 14,

Ho does not disclose wherein said dielectric material is further doped with ions that affect a net magnetic field at each transition ion. However, it would have been obvious to one of ordinary skill in the art at the time of invention that the transition ions in a dielectric material are affected by magnetic fields since they have unpaired electrons that are unstable and thereby can be moved by an electric field.

Art Unit: 2633

6. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho US 6,009,115 (Ho) in view of Hahn et al. US 3,714,438 A (Hahn).

Regarding claims 15 and 16,

Ho does not disclose wherein said dielectric material is doped with transition ions including chromium or ruby. Hahn disclosed a resonator doped with chromium and ruby ions (e.g., col./line: 9/64-67). It would have been obvious to one of ordinary skill in the art at the time of invention to use the dopants in Hahn in the Ho resonator so as to increase the optical amplification efficiency.

7. Claims 10, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho US 6,009,115 (Ho) in view of Marker et al. US 5,718,979 A (Marker).

Regarding claim 10,

Ho does not disclose wherein said dielectric material is doped with transition ions including iron. Marker disclosed a resonator doped with iron ions (e.g., col./line: 9/64-67). It would have been obvious to one of ordinary skill in the art at the time of invention to use the dopants in Marker in the Ho resonator so as to increase the optical amplification efficiency. It would have been obvious to one of ordinary skill in the art at the time of invention to use the dopants in Marker in the Ho resonator so that a relatively high positive expansion which, when combined with the negative expansion of the crystal phase, results in a low positive expansion glass-ceramic as disclosed by Marker (see col./line: 5/35-45)

Regarding claims 12 and 13,

Art Unit: 2633

The modified invention of Ho and Marker has a dielectric material that includes crystal and glass (see Marker, col./line: 6/20-25).

8. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ho US 6,009,115 (Ho) in view of Yao et al. US 6,580,532 B1 (Yao).

Ho does not disclose wherein said optical coupler includes a prism. Yao disclosed the use of a prism shaped coupler for a whispering gallery resonator (e.g., col./line: 7/1-2). It would have been obvious to one of ordinary skill in the art at the time of invention to use the Yao prism shaped couplers in the Ho invention as they are very commonly used and are efficient shapes to transmit optical energy.

Allowable Subject Matter

9. Claims 2-7, and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David C. Payne whose telephone number is (703) 306-0004. The examiner can normally be reached on M-F, 7a-4p.

Art Unit: 2633

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (703) 305-4729. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dcp



JASON CHAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600